NEWS

Unprecedented changes to North Atlantic winds could have major impacts on UK weather

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A groundbreaking study reveals that the North Atlantic Oscillation (NAO) could reach unprecedented magnitudes by the end of the century, leading to severe impacts such as increased flooding and storm damage in northern Europe.

The NAO is a large-scale atmospheric pressure see-saw in the North Atlantic and is a key driver of winter weather patterns in the UK, western Europe and eastern USA. It is measured by the gradient between high pressure over the Azores and low pressure over Iceland and controls the strength of the prevailing winds.

The study, led by a team of Met Office climate scientists, identifies climatological water vapour as a significant factor governing differences in long-term fluctuations in the NAO across climate model simulations. The research shows that limitations in the way that current climate models represent water vapour in the atmosphere lead to uncertainty in predictions of the NAO's future behaviour. Taking account of these limitations reveals a substantial response of the NAO to volcanic eruptions and greenhouse gases.

The findings indicate that under a scenario with very high concentrations of greenhouse gases by the end of the century, the NAO will increase to levels never before seen, posing severe risks of impacts from extreme weather such as flooding and storm damage. However, these impacts could be mitigated through efforts to reduce greenhouse gas emissions.

Lead author, Dr Doug Smith, emphasized the urgency of the findings: "These findings have major implications for understanding and preparing for extreme weather events. Our study suggests that taking model projections at face value could leave society unprepared for impending extremes. Mitigation efforts are crucial to prevent the severe impacts associated with an unprecedented increase in the NAO."

Key findings from the study include:

- The study shows that some of the differences between model projections of the NAO is due to climatological water vapour limitations in the models.
- The research reveals the NAO's significant response to external forcings such as volcanic eruptions and greenhouse gases.
- The study also takes into account the ‘Signal to Noise Paradox’, which suggests that climate models may underestimate the magnitude of the real-world NAO changes.
- The research results underscore the importance of mitigation efforts to avoid severe impacts from an unprecedented increase in the NAO.
- The study highlights the need for improved climate models to better predict future changes in the regional climate.

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